

REMARKS

This Response to Office Action is submitted in response to the outstanding Office Action, dated February 15, 2011. Claims 1 through 30 are presently pending in the above-identified patent application.

5 In the Office Action, the Examiner rejected claims 1, 4, 8-10, 12, 13, 15, 18, 22, 23, and 25-30 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. (United States Patent Number 7,352,688), in view of Ma et al. (United States Publication Number 2007/0064586), and further in view of Cimini et al. (United States Patent No. 6,005,876), rejected claims 2, 5, 6, 11, 16, 19, 20, and 24 under 35 U.S.C. §103(a) as being unpatentable over
10 Perahia et al. in view of Ma and Cimini, and further in view of Shattil (United States Patent Publication Number 2004/0141548), rejected claims 3, 7, 17, and 21 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. in view of Ma and Cimini, and further in view of Zhuang et al. (United States Patent Publication Number 2003/0123381), and rejected claim 14 under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. in view of Ma and Cimini, and further in
15 view of Jia et al. (United States Patent Number 7,103,325).

Independent Claims 1, 15, 27 and 30

Independent claims 1, 15, 27 and 30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Perahia et al. in view of Cimini and Ma. Regarding claim 1, the Examiner acknowledges that Perahia may have failed to disclose each of said long training
20 symbols to be transmitted on each of said N transmit antennas having two or more portions, each of said N transmit antennas having a set of a plurality of subcarriers, wherein each of said sets of said plurality of subcarriers are grouped into a plurality of subcarrier subgroups, wherein each subcarrier subgroup comprises two or more adjacent subcarriers and wherein each portion of each long training symbol is transmitted on a different transmit antenna in a given time interval
25 using one of (a) plurality subcarrier subgroup(s). The Examiner asserts, however, that Ma discloses transmitting a symbol (e.g. header symbol) in which subcarriers of a header OFDM symbol are divided into a set of subcarriers of each plurality of antennas, with each antenna transmitting the header symbol only on the respective set of subcarriers (i.e., each antenna has a set of subcarriers different from others) (paragraphs [0017]-[0018]). The Examiner further notes
30 that the sub-carrier set of Ma contains non-contiguous subcarriers rather than the adjacent subcarriers as claimed, but asserts that Cimini discloses providing (a) particular adjacent

subcarriers (e.g. adjacent tones) set to each antenna for transmitting (col. 3, lines 24-35).

As the Examiner acknowledges, Ma teaches that “sub-carriers of a header OFDM symbol are divided into a non-contiguous set of sub-carriers for each of a plurality of antennas.” (Paragraph [0030]; emphasis added; see, also, FIG. 5 and paragraphs [0031], [0034], [0090], and [0116]-[0117].) Based on the well known dictionary.com definition of the term “non-contiguous”, Ma does not disclose or suggest *wherein each subcarrier subgroup comprises two or more adjacent subcarriers*.

Furthermore, while Cimini teaches that “a given antenna is assigned a particular cluster of adjacent tones or carrier frequencies” (col. 3, lines 24-27), Cimini teaches that it was recognized that, “for a number of tones in the region of f_0 (or f_1) if those tones are clustered together and are the sole cluster provided along antenna 1, then the signal from antenna 1 will either be difficult to detect at the receiver or will likely contain many errors due to the path’s characteristics.” (Col. 3, lines 56-61.) Cimini therefore teaches to “provide a spreading out of the carrier tones across the transmission spectrum.” (Col. 3, lines 62-64; see, also, col. 4, lines 25-36.) Finally, Cimini teaches that “each cluster within a subset of tones can be constituted by a single tone rather than a group of adjacent tones.” (Col. 4, lines 53-55.) This latter teaching is similar to the teaching of Ma (see, above).

In summary, Cimini teaches using multiple subcarrier subgroups on one antenna within a given time interval. Each independent claim, however, requires wherein each portion of each long training symbol is *transmitted on a different transmit antenna in a given time interval using one of said plurality of subcarrier subgroups*. Cimini does not disclose or suggest using one of said plurality of subcarrier subgroups to transmit a portion of each long training symbol.

Furthermore, Cimini’s teaching to spread out the carrier tones across the transmission teaches away from the claimed invention, which requires *wherein each subcarrier subgroup comprises two or more adjacent subcarriers and using one of said plurality of subcarrier subgroups*. Independent claims 1 and 15 require transmitting a legacy preamble having at least one long training symbol, and at least one additional long training symbol on each of said N transmit antennas, each of said long training symbols having a plurality of subcarriers, wherein said subcarriers are grouped into a plurality of subcarrier subgroups, and *wherein each subcarrier subgroup comprises two or more adjacent subcarriers and is transmitted on a different transmit antenna in a given time interval*. Independent claims 27 and 30 require

receiving a legacy preamble having at least one long training symbol and an indication of a duration of a transmission of said data, and at least one additional long training symbols on each of said N transmit antennas, each of said long training symbols having a plurality of subcarriers, wherein said subcarriers are grouped into a plurality of subcarrier subgroups, and *wherein each*
5 *subcarrier subgroup comprises two or more adjacent subcarriers* and is transmitted on a different transmit antenna in a given time interval.

Thus, even as combined in the manner suggested by the Examiner, Perahia et al., Cimini, and Ma, alone or in combination, *do not teach every element of the independent claims*. Furthermore, based on the KSR considerations discussed hereinafter, the
10 combination/modification suggested by the Examiner is not appropriate.

KSR Considerations

An Examiner must establish “an apparent reason to combine ... known elements.” *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). Here, the Examiner merely states that it would have been obvious to a person of ordinary skill in the art to
15 modify Perahia and Ma further by alternatively using (an) adjacent subcarrier set in order to facilitate OFDM communication in a known manner.

Applicants are claiming a new technique for transmitting and receiving long training symbols wherein each of a plurality of subcarrier subgroups comprises two or more adjacent subcarriers and wherein each portion of each long training symbol is transmitted on a
20 different transmit antenna in a given time interval using one of the plurality of subcarrier subgroups.

There is *no* suggestion in Perahia et al., Cimini, and Ma, alone or in combination, that each of a plurality of subcarrier subgroups comprises two or more adjacent subcarriers, wherein each portion of a long training symbol is transmitted on a different transmit antenna in a
25 given time interval using one of the plurality of subcarrier subgroups.

Cimini’s teaching to spread out the carrier tones across the transmission spectrum for each antenna teaches away from the claimed invention. The KSR Court discussed in some detail *United States v. Adams*, 383 U.S. 39 (1966), stating in part that in that case, “[t]he Court relied upon the corollary principle that when the prior art teaches away from combining certain
30 known elements, discovery of a successful means of combining them is more likely to be nonobvious.” (KSR Opinion at p. 12). Thus, there is no reason to make the asserted

combination/modification.

Furthermore, Cimini's teaching to have *subcarrier subgroups that comprise two or more adjacent subcarriers* teaches away from the invention of Ma. The KSR Court discussed in some detail *United States v. Adams*, 383 U.S. 39 (1966), stating in part that in that case, "[t]he Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." (KSR Opinion at p. 12). Thus, a person of ordinary skill in the art would not be motivated to make the asserted combination/modification. If, for sake of argument, a person of ordinary skill in the art were to combine the cited reference, the person of ordinary skill would utilize the embodiment common to both Ma and Cimini and would have each cluster within a subset of tones be constituted by a single tone rather than a group of adjacent tones. (Cimini: col. 4, lines 53-55; and Ma: paragraph [0030].)

Finally, Ma's teaching and Cimini's teaching to spread out the carrier tones across the transmission spectrum for each antenna teach away from the claimed invention.

Thus, Perahia et al., Cimini, and Ma, alone or in combination, do not disclose or suggest transmitting a legacy preamble having at least one long training symbol, and at least one additional long training symbol on each of said N transmit antennas, each of said long training symbols having a plurality of subcarriers, wherein said subcarriers are grouped into a plurality of subcarrier subgroups, and wherein each subcarrier subgroup comprises two or more adjacent subcarriers and is transmitted on a different transmit antenna in a given time interval, as required by independent claims 1 and 15, and do not disclose or suggest receiving a legacy preamble having at least one long training symbol and an indication of a duration of a transmission of said data, and at least one additional long training symbols on each of said N transmit antennas, each of said long training symbols having a plurality of subcarriers, wherein said subcarriers are grouped into a plurality of subcarrier subgroups, and wherein each subcarrier subgroup comprises two or more adjacent subcarriers and is transmitted on a different transmit antenna in a given time interval, as required by independent claims 27 and 30.

Dependent Claims 2-14, 16-26 and 28-29

Claims 2-14, 16-26, and 28-29 are dependent on claims 1, 15, and 27, respectively, and are therefore patentably distinguished over Perahia et al., Cimini, Ma, Shattil, Zhuang et al., and Jia et al., alone or in any combination, because of their dependency from

independent claims 1, 15, and 27 for the reasons set forth above, as well as other elements these claims add in combination to their base claim.

Conclusion

5 All of the pending claims, i.e., claims 1-30, are in condition for allowance and such favorable action is earnestly solicited.

If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this application, the Examiner is invited to contact the undersigned at the telephone number indicated below.

The Examiner's attention to this matter is appreciated.

10 Respectfully submitted,



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